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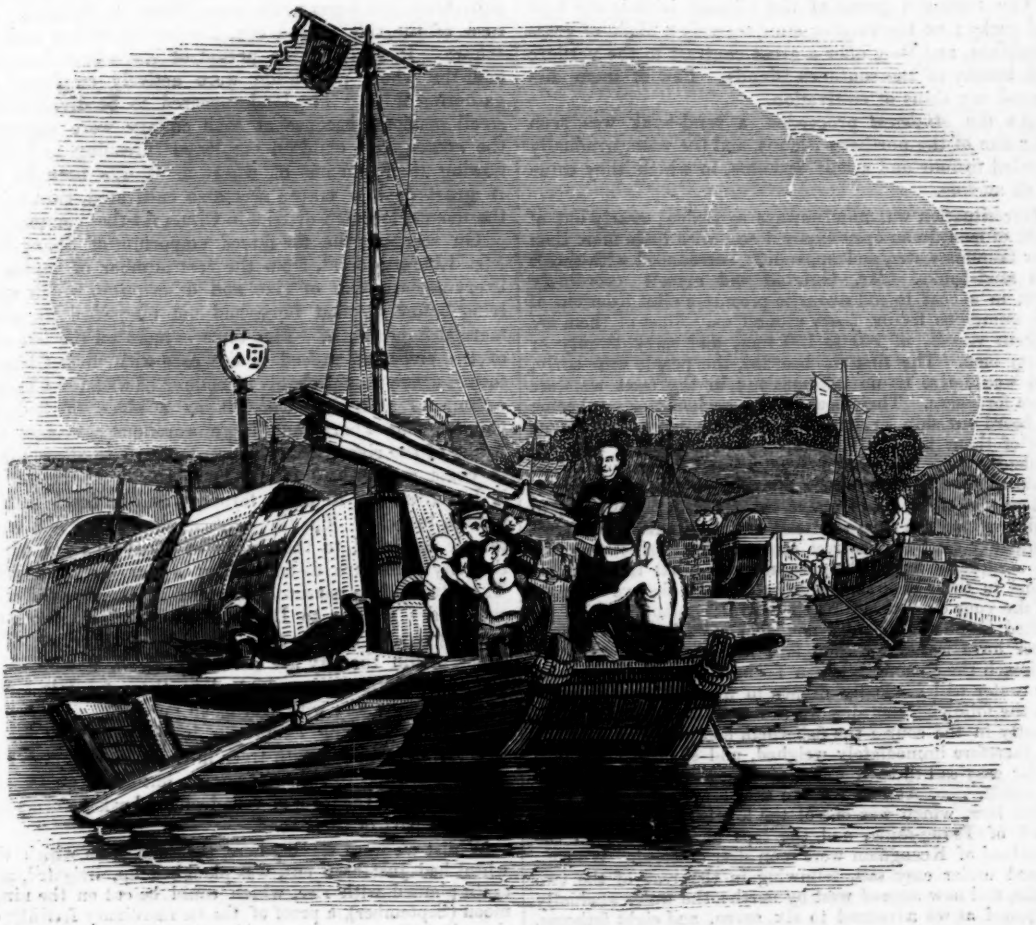
THE FIVE PORTS OF CHINA OPEN TO BRITISH TRADE.



CHINESE FISHERMEN.

IV. Shang-hai.

The port which we now arrive at bears an important relation to late events, as will be seen by a description of its situation and commercial character. Shang-hai is situated on the Woo-sung, which flows into the estuary of the great river Yang-tse-Kiang, or, *Child of the Ocean*. This latter is one of the most extensive rivers in the world, and passes over two thousand seven hundred miles of country in its circuitous route.

The advantageous position of Shang-hai, not only with respect to this river, but to the most important tea-districts which lie to the south, has caused it to become a great emporium of trade in general. The distance from Ning-po, the last port described, to Shang-hai, cannot much exceed one hundred miles.

The position of the capital of China, (Pekin,) and of the great canal which stretches nearly a thousand miles from north to south through China, should be traced on the map, in order that the reader may understand the importance of the towns which are seated at and near the embouchure of the Yang-tse-Kiang. From the fertile districts around the mouth of this river the supplies of rice, tea, and other provisions for the capital are chiefly drawn; the northern provinces being for the most part sterile, and insufficient in produce. Hence it follows that an enemy gaining possession of the principal seats of trade on that part of the river, is enabled at pleasure to cut off the supplies from Pekin and the adjacent country, having at command that northern branch of the canal which affords the great means of conveyance. It is not surprising then that the occupation of *Ching-kiang-foo*, and the approach towards Nankin, (both on this river), lately effected by the British, should at once put an end to the war, by impressing on the Chinese the necessity of an immediate submission.

The privilege of trading at such an emporium as that of Shang-hai will be therefore highly advantageous for the British. It is the great means of communication with Shantung and the coast of the Manchoo Tartars on the north, and with the tea district on the south. The climate both at Shang-hai and Ning-po is in summer oppressively hot, but in winter very severe, so that there is a great demand for broad cloths and furs.

In the passage from Ning-po to Shang-hai Mr. Lindsay, in the *Amherst*, passed inside the Chusan archipelago, a passage then probably made for the first time by a European ship: it was accordingly named the Amherst's Passage. The set of the tide was found to run north-east and south-west, right out of the large estuary of Che-kiang, which does not appear to discharge a powerful stream into the ocean; the sea being quite salt at low water, but of a thick muddy colour. The depth of water varies from six to eight fathoms, with a soft mud bottom.

The northern group of the Chusan islands are bold and rocky; on the smaller ones scarcely a blade of grass flourishes, and they offer a great contrast to the verdure and beauty of the southern islands. Few of them displayed any signs of cultivation.

As the *Amherst* proceeded, a sand-bank was seen near one of the northern islands, and the water gradually shoaled to four and a half fathoms, in which they came to an anchor.

Our situation was now noways agreeable; nearly out of sight of land, in an open exposed sea, with little more than four fathoms water, and apparently surrounded with shoals and sand-banks. Mr. Gutzlaff and myself ccordingly went in a boat to endeavour to procure a pilot from one of the numerous fishing boats around us. Most of them are Fokein vessels, of 100 to 150 tons, and carry twenty or thirty men. The first we boarded, the people were surly, and would give us no information; in the next we were more fortunate. Their boat having anchored, several came on board our ship, bringing fish, but no offers would induce any of them to pilot the ship into Shang-hai. This was evidently from fear of the mandarins; for though they all declared that no sum would tempt them to accompany us, yet one of them readily gave the following directions, to which we at the time paid not much attention, having so frequently received incorrect accounts from fishermen; but we eventually found them so accurate, that future navigators in these seas cannot do better than observe them:—"Take your departure from the northern island, (which we named Gutzlaff's Island), and steer N.W. by N.; you will never have less water than four fathoms; and when you approach the channel between Tsung-ming and Keangnam, the water will gradually deepen to five and six fathoms." On the following morning we saw two large junks steering exactly in the course the fisherman had pointed out to us; we therefore immediately weighed, and shaped our course under easy sail in their wake, sending the long boat a-head to sound. . . . At one P.M. we saw low land on the starboard bow, which was one of the low islands to the southward of Tsung-ming, and the tops of the trees on the mainland of Keangnam were soon after descried. We continued under easy sail, following in the rear of the two junks, and now steered west by north: the water gradually deepened as we advanced to six, seven, and eight fathoms. We now sailed at about four miles' distance from the land of Keangnam, which is one dead flat, richly cultivated and covered with high trees. The water was perfectly fresh from the time when we first saw land. At four P.M. we saw several war junks at anchor. On our approach, they got under weigh, and one hoisted an admiral's flag, and stood across our bow, firing several guns; but as we now set more sail and stood on, the fleet stood in to shore, manœuvred in such a way as to allow us to pass by them at a considerable distance, and then stood on in our wake, firing guns occasionally, while one large row-boat pushed on a-head to Shang-hai. At five P.M. we passed an extensive bank to the northward, and now steered to north-west. To the north of this bank there appears to be a passage, for we saw many junks sailing up on that side. We now had a fine breeze, with which we stood on till eight P.M. On passing one of the junks we had been following, we inquired what distance there was to the entrance of the river, which was stated to be about eight miles distant.

Leaving the ship within a few miles of the entrance to the river, Mr. Lindsay determined to proceed in his boat to the town. At each side of the entrance there is a fort: the northern one was found in better condition than most Chinese fortresses, and mounted eight guns on a platform. About a mile up the river is the small town of Woo-sung, where all vessels, on entering and quitting, take their port clearance. The river Woo-sung, which gives its name to the village at its mouth, is one of the most easily navigable in China. The only difficulties in its access arise from the extensive but even bank of shallow water, which extends between Gutzlaff's Island and the banks of Tsung-ming, from which there is a passage, three to four miles in breadth, and eight fathoms deep, to the river Woo-sung. The bar of the river presents no kind of danger. After leaving Woo-sung, the country is one dead flat, very much intersected with dykes and ditches; it is richly cultivated, and bears much resemblance to Holland. A turn of the tide caused Mr. Lindsay to anchor and go ashore. It was just the period of the wheat harvest, and the whole population were actively employed in gathering it in. The land appeared to be divided into small portions, because at each cottage were observed the women and children employed threshing and winnowing their portion of wheat as it was brought in. A great deal of cotton was also cultivated, this being the most celebrated district in China for that commodity.

On reaching the far-famed emporium of Shang-hai, Mr. Lindsay found, from the vast number of junks, of every variety both of size and description, which were lying before it, that fame had not magnified its commercial importance. This town is built on the *left side* of the river, as indeed is the case with most Chinese towns, which may probably be connected with the Chinese custom of assigning the left as a place of honour. Commodious wharfs and large warehouses occupy the banks of the river, which is deep enough to allow junks to come and unload alongside of them; in the middle it has from six to eight fathoms, and is nearly half a mile in breadth. On the landing-place there is a large temple dedicated to the Queen of Heaven, from which the city gates are distant about a quarter of a mile. The streets are narrow, and many of them paved with small tiles similar to Dutch clinkers, which give a far more agreeable footing than the slippery granite. The shops within the city are generally small, but wares of every description are exhibited in them for sale. Mr. Lindsay saw many with European goods.

The neighbouring country is dotted over with small villages, surrounded with trees in every direction. The population appears to be very great, but healthy and well fed; wheat, in the form of vermicelli and cakes, forms the principal part of their food.

Whilst we were staying here, the land from which the wheat had just been cut, was ploughed up, irrigated, and again planted with rice, which could be cut on the ninth moon (September), a proof of the extraordinary fertility of the soil. The winters are said to be very severe, and that the snow sometimes lies several feet deep for more than a month. Ice is kept in great abundance throughout the summer, but is principally used for the preservation of fresh fish. Each family appears to cultivate a small portion of ground with cotton, which I here saw of a light yellow colour. The nankeen cloth made from that requires no dye. In every cottage were the requisite implements for carding, spinning and manufacturing the cloth sufficient for their use; the remainder they sell. In several I saw the whole process in action at the same time, and took specimens away of the yellow cotton, both in its rough state, and after being manufactured into cloth. The price for a piece is from three to four mace, and the nankeen cloth from Shang-hai is said to be the best in the empire.

Provisions of all sorts were found to be cheap and abundant, with the exception of beef, which Mr. Lindsay did not procure anywhere in China. Goats were very plentiful, and equal in flavour to the best mutton. The fruits were found to be superior to those further south; peaches, nectarines, loguats, small apples, the arbutus, and various kinds of vegetables, were all to be procured at a cheap rate.

In the mouth of the Yang-tse-Kiang, and at about fifteen miles to the north-east of Woo-sung, is the island of Tsung-ming. This island is increasing yearly in

extent from the alluvial deposits of the great river. Its dimensions were estimated by Mr. Lindsay at above sixty miles in length, and from fifteen to eighteen in breadth. This island is interesting as being the largest and most populated alluvial island in the world, while it is one of the most fertile districts in China; its population is said to amount to half-a-million.

The approach to this island in a north-east direction is marked by two extensive sand-banks, joined together by a long flat which is probably passable by small boats at high water: the northern bank is overgrown with rushes, and had two huts on it. "In another century;" says Mr. Lindsay, "all these banks will probably form a fertile and inhabited island." After passing sundry bluff mud-banks and sands, to the north-west of this great bank, and meeting several junks lying at anchor, Mr. Lindsay's party landed up a small creek, and walked straight in-shore. The natives were at first very shy and timid, but soöned gained confidence; and a fine intelligent youth gladly undertook to accompany them to a town called Sin-kae, distant about three miles. The ground appeared rich; it was cultivated with rice, cotton, millet, and vegetables. It was intersected in every direction with dykes, which served the double purpose of draining the land, and irrigating it when requisite. The people do not live in villages, as is usual in most provinces in China, but hamlets, and single houses were scattered about in every direction. The population appeared immense; but the natives are healthy, vigorous, and of a fine ruddy complexion. Wheelbarrows, of a peculiar structure, are in common use for conveying the produce of the soil, and for the accomodation of travellers; they are furnished with a large wheel in the centre, which is covered, and the goods are arranged on each side of it: or the traveller himself may occupy a comfortable felt mattress on one side, and be balanced by his goods on the other. Several of these vehicles were met laden with salt of a peculiar whiteness, the produce of the island, several parts of which on the northern coast, though barren of every herb, yet have the quality of producing large quantities of this salt,which is at stated times carefully scraped from the surface. It is remarkable that the ground which possesses this peculiar property is often surrounded on all sides with fertile soil, but devoid of all saline particles.

The town is long and narrow, and contains some respectable houses and shops.

Among others, one attracted my notice, which announced in large characters that it sold Company's camlets and broadcloth; but on inquiry I was told that they had none of these precious commodities at present, but merely kept the characters on their sign to look respectable.

Apricots in abundance were sold at fruit-stalls; they resembled those of England, but were smaller in size and deficient in flavour. Having walked through the town, accompanied by a great concourse of people, and looked into various shops and houses, the party returned.

The friendly demeanour of these simple people, who now for the first time in their lives beheld a European, surpassed anything we had hitherto witnessed; and there being no mandarin in the place, no artificial check was placed to the natural friendly impulse of their hearts.

The people came in numbers with offerings of fruit, vegetables, and fish, earnestly expressing a hope that the strangers would return another day. A fine boy of about twelve years of age was so anxious to make Mr. Gutzlaff some present, that having nothing else, he took a neat bamboo carved comb, with which his hair was fastened, and gave it to him. By the time the party reached the boat, six hundred, at least, of the natives had assembled, all seeming to vie with each other as to who should be the most kind and friendly. And there is abundant evidence to prove that such is in general the true Chinese character when removed from the influence and example of their mandarins; the people desire a more extended intercourse with foreigners, and hitherto the government has anxiously interfered to prevent it.

The reader will gain a clearer idea of the immense advantages likely to result to British trade and enterprise by the opening of the port of Shang-hai from the following brief summary, abstracted from Mr. Lindsay's admirable report of the voyage of the *Amherst* to the northern parts of China, in the year 1832, to which we are mainly indebted for the details already given in the present article.

One of the chief causes of the importance of Shang-hai is found in its fine harbour and navigable river, by which it becomes the sea-port of Yang-tse-kiang, and the principal emporium of eastern Asia; the native trade of the place greatly exceeding even that of Canton.

On our first arrival I was so much struck with the vast quantity of junks entering the river, that I caused them to be counted for several successive days. The result was, that in seven days upwards of 400 junks, varying in size from 100 to 400 tons, passed Woo-sung, and proceeded to Shang-hai. During the first part of our stay, most of these vessels were the north country junks with four masts, from Teen-tsin, and various parts of Manchow Tartary, flour and peas from which place formed a great part of their cargo. But during the latter part of our stay the Fo-kien junks began to pour in, to the number of thirty and forty per day. Many of these were from Formosa, Canton, the Eastern Archipelago, Cochin China, and Siam.

The river Woo-sung proceeds from the great lake, Tahoo; it then traverses the great canal, and thus communicates with the Yang-tse-Kiang, the Yellow River, and Pekin: thence it enters the Pang-shan Lake, and flows by Soo-chow-foo, the capital of the southern part of Keang-soo, one of the most commercial, wealthy, and luxurious cities of the empire. From this place numerous navigable rivers communicate and traverse each other in every direction. Thus it appears that this river affords a commodious water-communication with the remotest parts of the empire, from Pekin to Yunan, from the eastern coast to the centre of the deserts of Tartary. The advantages which the English may derive from the liberty of trade with this place, are incalculable. Here is a nation in population nearly doubling that of all Europe, combined with a sea-coast of fully 3000 miles, abounding with the finest rivers and harbours in the world. Its ports and cities are filled with an industrious, enterprising, wealthy, and commercial population, who would all hail the establishment of foreign trade with joy.

While we dwell with pleasure on the advantages likely to result to Britain from the opening of this port to her merchants, let us not forget to contemplate with gratitude the means thus placed in our power of sending the light of the Gospel among these deluded worshippers of many gods, whose superstitions, yet but partially known to us, are in some sort to be traced in the national character, of which deceit and lying form a principal feature.

I USED to wonder why people should be so fond of the company of their physician, till I recollected that he is the only person with whom one dares talk continually of oneself, without interruption, contradiction, or censure.—MRS. H. MORE.

MEN of wicked lives would be very glad there were no truth in Christianity at all; and if they can pick out any one single article in the Christian religion, which appears not agreeable to their own corrupted reason, or to the arguments of those bad people, who follow the trade of seducing others, they presently conclude that the truth of the whole Gospel must sink along with that one article. This is just as wise as if a man should say, because he dislikes one law of his country, he will therefore observe no law at all; and yet that one law may be very reasonable in itself, although he does not allow it, or does not know the reason of the lawgivers.—DEAN SWIFT.

A CHEAP CAMERA LUCIDA,

BY SIR GEORGE S. GIBBES.

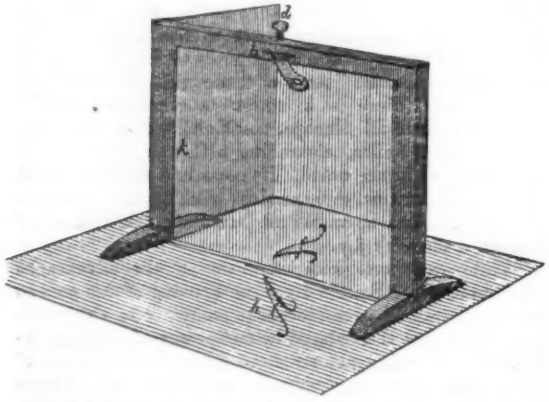
IN the *Saturday Magazine*, Vol. XXI., p. 144, we called the reader's attention to an economical form of Camera Lucida, recently submitted by Sir John Robison to the Society of Arts for Scotland.

After the publication of that notice in our pages we received a communication from Sir George S. Gibbes, directing our attention to a similar contrivance invented by him, and made known to the public through the *Philosophical Magazine*, so long ago as February, 1812. The priority of claim to this useful invention undoubtedly rests with Sir G. S. Gibbes, and we readily avail ourselves of his kind permission to copy his figures and republish his account,—agreeing with him that, "a revived description may be of general interest."

THE great simplicity of the instrument about to be described may entitle it to rank among the most useful of delineators: because, to the advantage of its simple structure and applicability without straining the eyes, it adds a degree of truth not to be exceeded. Without requiring the aid of additional reflecting surfaces, this instrument represents objects as in an ordinary mirror, while it allows sufficient light to pass for the guidance of the hand behind it. Thus, by a little management both the hand directing the pencil, and the object to be traced, may be equally well-defined and clear. The following diagrams and description will fully explain the construction of this instrument, and enable the amateur, with the assistance of a cabinet-maker, to procure one for his own use.

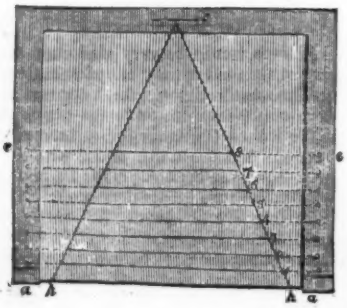
The first requisite is a piece of plate glass, a foot square, perfectly clear, polished, even, and parallel throughout. This is mounted in a frame (fig. 1), about an inch and a half wide, and an inch thick.

Fig. 1.



Instead of wood at the bottom, there is a brass wire, or a thin narrow plate, capable of holding the three sides of the frame together so as to prevent the glass from falling out. The glass rests upon this wire or plate, so that it must be firmly fixed to the feet of the frame.

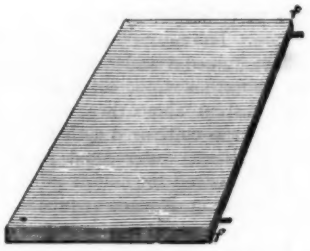
Fig. 2.



The feet must be exactly at right angles with the frame, so that when the plate is placed upon an even table it will stand perpendicular. The upper part of the frame at *b* is furnished with a long groove for the reception of a brass sight, an inch broad, furnished with a small eye-hole: this is fastened at the top by the screw *d*, which may be loosened at pleasure.

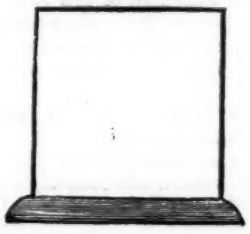
The frame (fig. 2) is divided into two equal parts beginning at the upper part, from the groove *b* (fig. 1), to the bottom of the feet *a*, or of the brass wire. The lower part from *e* is subdivided into eight equal parts, and on each side of the frame are eight equidistant holes

Fig. 3.



The board, fig. 3, is called the table. Its breadth is the same as that of the frame. It contains two brass pins, which exactly fit the holes in the frame. The table can thus be raised or lowered, so as to magnify or diminish objects correctly, according to the size required. On the opposite side of the table, at each corner, are supports, so placed that they may be conveniently pushed up or down. The supports pass through two holes in the table, and in each are eight small holes of the same size as those in the frame, so that by means of a brass wire under the table it may be kept firm in a horizontal position.

Fig. 4.



The blind (fig. 4) is made of a piece of wood, bevelled, one foot long, one inch and a half wide, and one inch in thickness. A brass or iron rod is bent so as to form a square to which the wood serves as a support. This frame is then covered with writing paper of moderate thickness.

In making use of the apparatus thus far described, place the object (*h*, fig. 1,) which is to be copied, upon a flat table on a level with the window: place some blank drawing paper on the right hand; and between the object and the drawing paper place the transparent reflecting plate of glass, mounted in its frame, and shown in fig. 1. The blind (fig. 4) is to stand at *k* (fig. 1), at right angles with the glass on the right hand, so that the drawing paper may lie in the broken shade, and a person looking through the glass from the left side will observe the object depicted on the paper. If the figure be not sufficiently distinct, you darken the blind by hanging a sheet of paper upon it: if it darken too much it may be removed further from the glass.

It is of consequence that the proper degree of shade be thrown upon the paper; because, if it be too dark, the lines of the drawing and the point of the pencil cannot be seen distinctly; and if it be not sufficiently dark, the representation will be too faint. In copying

with the assistance of the apparatus as already described no eye-hole is used, because the eye is easily kept in a suitable position when the drawing is properly placed; but in the experiments about to be described, where the objects are diminished or magnified, whether a picture or a prospect in perspective, the eye-hole must be used, since it is necessary to look constantly at the same precise point of view.

The diminishing of an object is effected by raising the height of the table. Since an object placed on the left side of the glass is always represented on the right side, although the surface of the table be not of a uniform height, it will be found that, by taking a fixed point of view, the object will be diminished, the nearer the reflected image approaches to this point, and will be magnified as the reflected and transmitted image is made to recede from the eye. Or rather, the image will appear larger than the object when it is removed further from the eye in a fixed position than the object itself, and *vice versâ*.

This may be more clearly illustrated by referring to fig. 2. The parallel lines 1, 2, 3, 4, 5, 6, 7, 8, represent the different heights of the table. If now the line *h* were to be diminished, it would be reduced $\frac{1}{8}$ upon the table at 1, $\frac{1}{4}$ at 2, $\frac{3}{8}$ at 3, and $\frac{1}{2}$ at 4, as is shown by the lines of sight where the parallel lines intersect.

Fig. 5.

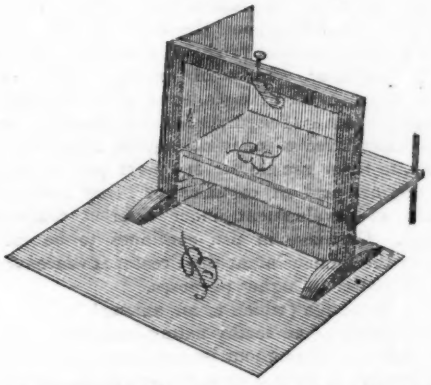


Fig. 5 represents the instrument, where the letter B is diminished one half; the table with the paper being placed in the fourth hole (fig. 2.) The object must be viewed through the eye-hole, which is on the left. By this method of diminishing, it is easy to take in prospects and objects in perspective.

In order to depict vertical objects the following simple additions to the apparatus are necessary:—

Fig. 6.

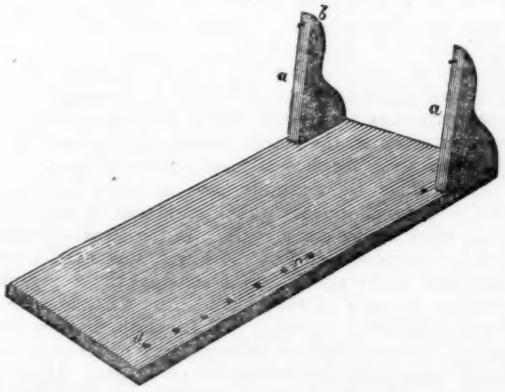


Fig 6 is a board two feet and a half in length. At the distance of six inches from one end, and at the width of the glass plate with its frame, two holes are bored so that the supports of the table may pass through and be placed upright. Behind the holes two perpendicular pieces of wood, *a a*, are fastened; and at the upper part two props which may pass into the holes of the table, into which the feet were before fixed, so that the table may be secured both at the top and bottom, and all shaking prevented.

Holes from *c* to *d* are to be bored in the board for the reception of the sight-piece, shown in the next figure. This sight-piece may be of brass or wood: its height is about six inches, and it is furnished at the top with a round brass plate one inch in diameter, in which is the eye-hole.

Fig. 7.

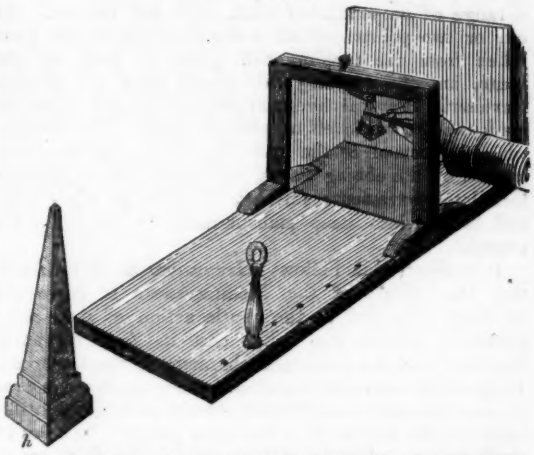
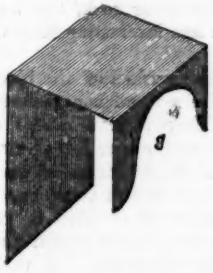


Fig. 7 shows the method of using this arrangement. The paper is attached securely to the table; and the reflecting glass plate placed about six or eight inches from it upon the board, and parallel with the table. The blind, (fig. 8,) which is made of wood, pasteboard, or

Fig. 8.



paper, then covers the space between the glass plate and the table, so that the opening *g* may be on the right hand. The sight-piece is then placed in one of the holes, so as to give the desired power of diminishing, the observer taking care that his head does not intervene between the object and the glass. In this way objects are diminished, and may easily be drawn upon the upright paper. All kinds of objects, such as plants, academy figures, &c., may thus be copied under circumstances in which the camera obscura, as usually constructed, could not be conveniently employed.

Mr. Horsley, in his *Britannia Romana*, making a sort of apology for that work in his preface, has these words: "I have always looked upon it as an instance of Divine Wisdom, that it should be so ordered that different men have such different tastes and inclinations. By these means the several parts of knowledge are more cultivated: and I think we owe our thanks to any one who will apply himself to the study of any particular thing, though it seem minute, and may not suit our taste or inclination to pursue it ourselves. This gives us, at least, an opportunity of knowing, on easier terms, what can be said on that subject."

LETTERS TO THE READER.

No. IV.

MY DEAR READER,

Will you walk with me awhile along the beach from Dover eastward? The various objects in the way will suggest ideas that may remind us of the benefits which natural science has conferred upon society, and, receiving health and pleasure, knowledge, and the power of doing good, from the study of creation, we may the more earnestly desire that every one blest with reason should share, by the extension of practical education, the same bodily, mental, and moral improvement.

Our path lies over a belt of shingle, which runs between a range of perpendicular chalk cliffs and the sea. At one or two points enormous masses of chalk that have fallen from the toppling cliff appear to block up the route, but the receding tide leaves room for passing travellers. Several irregular lines of tattered sea-weed mark the various levels of previous tides. The shingle, which is formed of the smoothest stones, has just been washed by the ebbing waves, and looks like a polished tessellated pavement; shifting, however, at every tide, and thrown into steep embankments by the sea-ward storms.

It is observed in Fellows' *Excursions in Asia Minor* that the shingle of the Mediterranean is composed of stones flattened by the gentle action of that comparatively tideless sea. But here its form evidently depends upon the geological character of the materials. Flints, by far the most numerous, are worn down to oval shapes, while granites, of which there are several beautiful varieties, are met with in flattened pieces. Nodules of chalk become tolerably well rounded. The flints are of all colours; many of the purest black, and others variegated with half-transparent chalcedonies. Here and there a sparkle of crystallized quartz, or flinty spar, reflects the sunlight, and adds to the brilliancy of this natural mosaic. The more closely we watch the motive force of water in its arrangement of these specimens from every neighbouring rock, the less we shall miss the smoother but less interesting foot-way of the Marine Parade.

You see that the surface of the blocks of chalk that face the sea are fretted and honey-combed by the action of the waves. They remind me of the dissection of alum by the solvent power of water. If we place in water a mass of alum, all traces of whose exterior crystalline form has been broken away, the fluid will dissolve it unequally in different directions, "until an immense variety of geometrical forms appear stamped as it were, or carved upon its substance." A variety of forms are also left by the washing action of the wave upon the chalk; but its chemical and mechanical composition being much more complex than that of alum, the resulting bas-relief is far more various. Casual inspection is enough, indeed, to show it to be a very museum of *organic* forms. Fossil shells first catch the eye, and of these, the most numerous are sea-eggs, of a circular form, from one to three inches in diameter, flattened upon the under surface, and either conical or more or less rounded above, according to the different species to which they severally belong.

We are accustomed in common language to consider the skeleton of an animal as necessarily internal; but the *organ of mechanical support*, whether clothed by the softer tissues, as in man, or placed externally, as in the tortoise, is in either case correctly termed a skeleton. In the sea-eggs it is composed of many pieces, arched like a dome over the more perishable parts. Embossed with admirable patterns, and defended with long projecting spines, it forms a coat of armour of surpassing workmanship. We will not stand to examine it more in detail at present, as I wish to give you drawings of the more perfect specimens that I have collected here and elsewhere, when I shall devote a letter to the history of these interesting animals.

You observe as we extend our walk the countless myriads of sea-eggs that are embedded in the chalky rock. As far as the eye can reach, every part of the cliff is filled with fragments of the shells. Not a generation, but a whole race from its creation to its extinction, must be here interred: for the living species which are met with at the present day are distinct from these, although formed upon the same general plan of construction. And here is indeed an admirable proof of the unity of creation. Every fresh observation strengthens the idea, that not only different species which existed at periods remote from one another, but that all animals, however seemingly dissimilar in external appearance, are created upon one sublime and simple outline. The skeletons and other organs of lost animals that are found buried far below the surface of the earth, are analogous in design to those of corresponding and existing species; thereby implying, through a series of ages, the uninterrupted agency of one Omniscient Creator.

Moreover, every organ of the human body passes during the progress of its growth through the same successive stages as can be traced in ascending from the simplest to the most complex of the inferior animals. The cartilaginous and flexible condition of an infant's skeleton answers to the state of bone as it exists in fish. Strength is gradually imparted to this feeble framework by the deposition of microscopic crystals of a hard inorganic salt throughout the body of the cartilage. These crystals are first produced at a certain number of known points, or centres of crystallization; and the reason why fish, for example, seem to be furnished with so large a number of separate bones is, that these centres, which extend and in many cases grow into each other in man, in them remain for the most part unconnected. The original plan of organization being the same, the amount of development under different conditions is unequal. Cartilage in fish continues to be cartilage, while in the human infant the Creator advances the same form of matter to higher purposes.

Even in sponge (which is an animal) similar microscopic crystals of an earthy nature have been discovered to be scattered throughout its substance, but not in sufficient number to form a solid support to the more delicate materials. Stooping down to examine the refuse which the last tide has left upon the beach, we readily collect at least three recent species of branching sponges. Accustomed to the undivided form of this animal, which is imported from the Levant for domestic use, we are apt at first to neglect the beautiful natives of our own shores. Of the form of coral, but destitute of its stony skeleton, these soon become equal favourites with the young observer. The largest and most frequent kind is of a light fawn colour, and rising from a stem about the thickness of a cedar pencil, divides into numerous and slightly flattened branches, which end abruptly in lengths from one to six or seven inches. The small holes upon the surface of the branches are so many entrances to internal canals through which pass currents of water, the marine animalcules suspended in the water being the food of these curious animals.

From these we naturally pass to those large and branching fossil sponges which stand out in such bold relief from the sea-worn chalk. In the blocks of chalk that have been dissected by the waves, studded with sea-eggs and other shells, are best seen these gigantic sponges, in casts of black and brittle flint, forming a strong contrast to the white bed in which they are preserved. Several hundred different forms of these curious fossils have been discovered by geologists. Many of these are to be found in the neighbourhood of Dover, some branching like the recent species before described, some funnel-shaped with slanting lip, and others, again, like enormous fungi expanding from a thick footstalk

into a broad and solid disk, on the circumference of which may be observed the orifices that led into the alimentary canals. The eye soon becomes educated to detect organic form. Where without knowledge we saw but so many shapeless stones, observation multiplies the objects of our admiration. Whereas we could see neither design nor beauty in these inanimate remains, the due exercise of our faculties leads us to fresh evidences of a PERPETUAL CREATOR.

The property of sudden expansion possessed by water during its passage into ice is occasionally illustrated on a large scale along this crumbling sea-wall. The numerous crevices in the substance of the chalk which are caused by successive changes of temperature and moisture, allow of the lodgment of drainage-water from above. The freezing of this water during the winter months transforms it into solid and expanding wedges, which rend away large masses of the rock. The danger of frequenting the overhanging cliff at such a time is obvious.

Crows and gulls are the natural scavengers of the shore. Several hours *before* a gale sets in, while yet the heavens are cloudless, and the unpractised eye is quite unable to detect the coming change, the latter birds appear with unerring instinct upon the spot where dead fish, and other animal substances which constitute their food, will shortly be thrown up.

The awful hurricane that swept over Europe during the middle of the month of January last, and which visited this shore during the night of Thursday, 12th January, was here preceded by lovely weather. Before the noon of that day I remarked the sudden appearance of six gulls upon the cliff, while the sea was still blue and the sky without a cloud; and going upon the beach again, four hours after sunset, those ominous birds were still, to me, the only harbingers of the tempest. On the following morning, however, the breakers were appalling; the shore was strewn with portions of a wreck, and the feast of carrion had commenced.

Still it may be as well to observe that these partial migrations of gulls can only be considered as weather-signs, when taken in conjunction with other circumstances. After a long continued calm, for instance, these birds visit different shores and shallows in search of food, at which time they are not necessarily the forecomers of a storm. In the same way, on board ship, cats are certainly very playful before a gale comes on; their fur is highly charged with electricity; they fly from rope to rope, and scamper up the rigging in an unusually excited state, carrying their tails arched in a peculiar manner. It is common in such a case to hear a sailor say, "The cat has a gale in her tail." I have, however, seen this without bad weather following, although each sign has undoubtedly its positive value when weighed with the indications of the marine barometer.—But to return to the aërial scavengers.

Some years since, during a season of extraordinary plenty, large numbers of dead fish were cast away near the city of New York, and yellow fever speedily attacked the population as a consequence of the impurity of the air, caused by the neglect of the putrefying mass. The blood of animals which breathe the gases and vapours that escape from decomposing organic matter becomes poisoned. Three simple agents are appointed by a merciful Providence which, at such places where their actions are united, at once prevent the corruption of animal fluids, and teach man the means of extending this prevention throughout the habitable globe. 1st. *Water*, in the form of tides, rivers, and rains, dissolves in part the solid, and dilutes the liquid, portions of offensive substances. 2nd, *Air*, dissipates the gaseous and vaporous products of the same. 3rd, *Living scavengers*, worms, beetles, carrion, fish, birds, and beasts, devour or remove what remains. Wherever these agents are employed, plagues and putrid fevers are unknown. But, unless the dissolving, diluting, and *locomotive* powers of water, and the ventilating force of air, are added to the instruments of the scavenger, disease ensues.

The severe pestilences that used to recur in London at intervals of about every twelve years, previous to the great fire of 1666, were the natural effects of defective sewerage; and the evil to this day is only lessened, not prevented. In the parish of St. George's, Hanover Square, which is a wealthy part of the Metropolis, one female, upon an average, dies annually in every fifty-seven of the population; but in Whitechapel, under less favourable conditions, the annual mortality of females is one in twenty-eight. In the latter district direct communication between private houses and underground sewers is comparatively rare. A resident surgeon does not recollect seeing a single sink in the dwellings of the poor; the refuse water, &c., is thrown upon ill-paved courts, from whence it is evaporated into the atmosphere. To breathe this corrupted air, entails a double amount of death upon the parishioners, over those of other places where intelligence is preventing these causes of disease. The instincts of carnivorous birds should have earlier taught us the duty of keeping clean the surface of the earth.

> See man from nature rising slow to art!
> To copy instinct then was reason's part;
> Thus then to man the voice of nature spake—
> Go, from the creatures thy instructions take:
> Learn from the birds what food the thickets yield;
> Learn from the beasts the physic of the field;
> Thy arts of building from the bee receive;
> Learn from the mole to plough, the worm to weave;
> Learn of the little nautilus to sail,
> Spread the thin oar and catch the driving gale.
> Here too all forms of social union find,
> And hence let reason, late, instruct mankind.—POPE.

But reason can do more than copy instinct. Observation of the material world is constantly being rewarded with discoveries important to the well-being of society. When we hear of inventions originating with so-called uneducated men, it will be found upon inquiry, although they may not have had the advantage of scholastic training, that the faculty of observing natural phenomena had been early exercised. I would instance Mr. Read, the inventor of the stomach-pump. Being the son of a Kentish farmer, he was brought up to the same employment. Having undertaken the laying out of some gardens for the clergyman of his parish, this person was led to consider the best means of distributing water for horticultural purposes. By observing the conditions under which fluids are most easily transferred from one place to another, he soon effected an improvement in the small engine that is usually employed for watering plants.

It is instructive to notice more particularly this stage in the inventor's mind. He had observed certain facts, and by mental reflection, with reading, had risen to a knowledge of the principles which governed them. But up to this point he laboured on a beaten road. Most practical men were acquainted with the facts, such as the amount of atmospheric pressure upon fluids, &c.: many well knew the principles of the science. The third step in the inquiry was to apply these principles, and the mechanical apparatus that illustrated them, to fresh conditions. If water could so easily be removed from one vessel to another by a common syringe, why not liquid poisons from the stomach? By modifying the syringe then in use, and attaching to it a long elastic tube intended to be passed into the stomach, Mr. Read successfully answered this important question, and has been the means, under Providence, of preserving many valuable lives. The death of the Bishop of Armagh, which occurred in the year 1822, from taking laudanum by mistake, had stimulated Mr. Read in carrying out his experiments, and Sir Astley Cooper, upon being shown the instrument in its perfect state, exclaimed, "Had you brought me this three weeks ago, I could

have saved the life of a young lady, who died from taking laudanum. I sat hour after hour by her side, watching her progress to dissolution, without being in the least able to avert her fate."

The history of such discoveries made by the benefactors of our race are the charts of education. The foundation of all natural knowledge, from which arises so much of human happiness, is the observation of matter by the senses. "This foundation must be crowned with a superstructure of thought and reason." But observation, of soil for example, is as necessary to the farmer who practises the art of cultivating land, as it is to the scientific chemist who undertakes to analyze earths into their elemental parts. Both, by handling, must acquaint themselves with such properties of matter as have reference to the objects that they have in view. For this reason I would that specimens of soils were to be seen in every village free-school, from which the eye of every boy might be taught the physical characters of the materials that yield them food. Few might be able to grasp the principles that preside over the phenomena of nature; still fewer might possess the reflective power to discover fresh combinations of facts; but all would be better able to avail themselves of the arts of life.

An active mind is always led on from observation to experiment; it not only "carefully observes phenomena as they spontaneously present themselves in the ordinary course of nature, but purposely contrives and varies circumstances," in order to view them under so many different conditions. It was by the experimental vaccination of his own children that Dr. Jenner obtained the knowledge and the means of saving, in his own life-time, the lives of more human beings than Napoleon sacrificed. Dr. M. Von Katona, an Hungarian physician, in a very malignant epidemic of the measles which occurred in the winter of 1841, inoculated 1122 persons, either with a drop of fluid from the eruption, or with the tears of patients suffering from that disease. This experiment failed only in seven per cent.; but ninety-three in a hundred took the measles in a mild form. Not one died. I mention these examples to show the important consequences that flow from the habit of observing and experimenting with natural phenomena.

Moreover, the desire of childhood for associating with nature is a provision for its education. It is endowed with the blessing of receiving exquisite pleasure while in the act of reading knowledge as it is written in capitals upon a beautiful creation. Its instinctive love for the open air leads towards objects expressive of Almighty power and goodness. Even with respect to physical health, so impressed are the highest authorities upon the subject, of the wholesome effect of sun-light and pure air upon the growing constitution, that Sir Astley Cooper not only hired for his delicate infant a house which stood alone and exposed to free atmospheric currents on every side; but ordered the child, whenever the weather permitted, to have its meals in the open air. With all the powers of art at his command, he recognised these simple means as the most potent remedies.

The craving after artificial toys which many children exhibit is only an artificial appetite growing like a weed upon the neglected faculties of our being. But the taste for natural objects clings to the last ruins of human nature. An English captain, a prisoner, and afflicted with insanity, was confined for years during the war with France, in an hospital at Paris. It was the custom, some forty years ago, even among civilized nations, to chain the more violent madmen in dark and unwholesome cells. The Englishman in question, being subject to the most furious paroxysms, aggravated, no doubt, by national prejudice against his keepers, had long been closely fettered. Pinel, an illustrious and humane physician, believed that the cure of this unfortunate class of patients would be hastened by increasing their liberty and social comforts. He had earnestly laboured to beget public confidence in the power of kindness over the insane, and now obtained the consent of his government to unchain, at his own personal risk the lunatics of the hospital in which the English captain was secured. This fact has already been recorded in the *Saturday Magazine*, but I wish to call your attention more particularly to the effect of liberty upon our unhappy countryman. After jeering his keepers with cowardice and daring them to unloose him at their peril, he was brought from his cell, where the direct rays of sunlight could never reach him, into a court-yard open to the heavens. The powerful muscles (for his bodily strength had once been great,) with which he had just threatened vengeance upon those around him, were paralysed by the kindness of Pinel, and by the light of the external world. "Oh! how beautiful!" were his first words, as he fell upon his knees, and wept like a child at the glory of creation. From that hour he was a calm and altered being.

Children do not readily tire of listening to lessons based upon the evidence of their senses. Walking as with ourselves, between the sea on one side and a chalk cliff on the other, let them compare the living marine animals with the fossil forms of organic bodies. Tell them that under the microscope the whole substance of the chalk is found to be filled with the remains of animalcules which served as food to the larger species. And point out to them the level and alternate layers of chalk and flint, piled one above another, which stretch along the coast as far as the eye can reach. The regularity of the strata will enable the youngest to perceive that the cliff must be *the sediment from a fluid;* the resemblance of the fossil, with the living forms, can leave no doubt in their minds but that *that fluid was an ocean*. Remind their hearts of the infinite power of God over the matter of his own creation, and they will praise his omnipotence for raising up dry land for the abode of man.

Compare in your own mind, my dear reader, the effects of such repeated lessons with the results of our education derived exclusively from books, which then become irksome. Follow the young observers home, and watch the interest with which they read about the objects that are associated with their daily walks and occupations. Witness the healthful countenances beaming with fresh intelligence and innocent pleasure after each excursion. Regard the ease with which the various forms that characterize the different kinds of matter are detected and described, and reflect how much of the health and happiness of their future homes depend, under God's blessing, upon their habit of observing with accuracy the phenomena of matter. For we ourselves are formed of this created matter. Our frames are liable to be influenced by every material agent. Our food is wholesome and abundant in proportion to the practical knowledge which we possess of seeds and soils. Diseases are as easily prevented, as they are hardly cured, if early observation has taught us the habit of weighing the value of small beginnings, and of warding off their remote effects. Lasting intellectual pleasure is as richly found in the study of creation as it is sternly denied us from selfish and artificial sources. Furthermore, the invisible things of God, even the eternal attributes of His power and goodness, are clearly seen by the things that are made, so that we are without excuse in neglecting these simple means of health and wisdom. For the present adieu!

Believe me, still yours affectionately,

F.

THOSE things are to be held possible, which may be done by some person, though not by every one; and which may be done by many, though not by any one; and which may be done in succession of ages, though not within the hour-glass of one man's life; and which may be done by public designation, though not by private endeavour.—BACON.

JOHN W. PARKER, PUBLISHER, WEST STRAND, LONDON.